Remarks

The final Office action dated June 2, 2011 has been carefully reviewed and the foregoing amendment and following remarks have been made.

Status of the Claims

Claims 13-19 and 21-26 are pending in the application. Claims 13-19 are allowed, and claims 21-26 are rejected. Applicants have amended independent claims 21 and 26, and have provided discussion below for distinguishing the present claims, as amended, from the art cited against them.

Clam Rejections - 35 USC § 103(a)

The rejection of claims 21-26 under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 6,289,717 to Thundat et al. (hereinafter "Thundat '717") in view of U.S. Patent No. 6,016,686 to Thundat (hereinafter "Thundat '686") and PCT International Patent Application No. WO 0101121 to Oden (hereinafter "Oden") is traversed.

Thundat '717 discloses a motion sensor having a microcantilever positioned to interact with a specimen in a fluid sample, including biological samples. However, Thundat '717 does not teach the use of a force transducing sensor to detect movement of motile specimens. Thundat '686 discloses the use of live biological specimens with the microcantilever, but depends on differences in surface charge to provide the force that is measured by the sensor.

As acknowledged by the Examiner, neither Thundat '717 nor Thundat '686 discloses that motile frequency and/or binding behavior of a biological specimen on the cantilever is measured to facilitate measuring concentration of an analyte. To overcome this noted deficiency, the

Examiner cites to Oden as disclosing a microcantilever that is coated and otherwise configured to interact with analytes in a sample solution.

> Oden teaches on page 4, lines 22-34 that oscillation frequency of the microcantilever is measured before, during and after a binding event to determine a change in frequency attributable to the presence of the analyte. Claim 1 further recites that concentration of an analyte in the solution is determined by comparing observed frequency shifts. Motile frequency of analytes can be inferred from this detectable change in cantilever movement.

The Examiner concludes that "[a]t the time of the invention, it would have been obvious to use the Thundat '9717 system to measure the motile frequency of a plurality of successive biological analytes in order to determine analyte concentration. As evidenced by Oden, it is well known in the art to determine analyte concentration based on the frequency at which the cantilever is deflected. One of ordinary skill would have understood that observed variations at which the cantilever vibrates are inherently tied to the rate at which motile analytes impact the cantilever."

Applicants respectfully traverse this assertion. Claim 21, as amended, recites a method for detecting motion of motile specimens within a medium, comprising: "directing the motile specimens at the at least one force transducing sensor; sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor ...; and determining the characteristic motile frequency of the motile specimens by detecting the dynamic interaction of the motile specimens with the at least one force transducing sensor...."

No combination of Thundat '717, Thundat '686, and Oden describes or suggests the invention of claim 21. More specifically, no combination of Thundat '717, Thundat '686, and Oden describes or suggests directing

motile specimens at at least one force transducing sensor, and sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor to determine the characteristic motile frequency of the motile specimens. As set forth above and acknowledged by the Examiner, neither Thundat '717 nor Thundat '686 describes or suggests measuring motile frequency and/or binding behavior of a biological specimen on the cantilever to facilitate measuring concentration of an analyte.

Oden does not overcome the noted deficiencies of Thundat '717 and Thundat '686. Oden describes a cantilever sensing method that involves the combined analysis of one or more higher resonance-mode frequencies, i.e., the simultaneous observation and combined consideration of multiple resonance-mode frequency shifts. Oden does not describe or suggest directing motile specimens at at least one force transducing sensor, or sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor to determine the characteristic motile frequency of the motile specimens.

For at least these reasons, claim 21 is patentable over the combination of Thundat '717, Thundat '686, and Oden. Claims 22-25 depend, directly or indirectly, from claim 21 and are also patentable for at least the reasons that claim 21 is patentable.

Claim 26, as amended, recites a method for determining characteristics of a motile specimen under analysis, comprising "directing motile specimens in a fluid toward a surface of the at least one force transducing sensor at an angle substantially orthogonal to the surface; causing an interaction of the motile specimens with a coating on the surface capable of interacting with the motile specimens; allowing the motile specimens to interact with the force transducing sensor; and detecting a

measureable characteristic of the motile specimens in accordance with the interaction with the force transducing sensor using a beam directed through a transparent substrate toward the at least one force transducing sensor and a beam reflected by the at least one force transducing sensor through the transparent substrate, the transparent substrate forming a wall of the chamber, wherein the interaction of the motile specimens with the force transducing sensor as a result of the motion of the motile specimens is categorized as one of an impact, an oscillation, and a retention to facilitate identifying a binding behavior of the motile specimens."

With reference to the arguments set forth above with respect to claim 21, no combination of Thundat '717, Thundat '686, and Oden describes or suggests the invention of claim 26. As acknowledged by the Examiner, neither Thundat '717 nor Thundat '686 describes or suggests measuring motile frequency and/or binding behavior of a biological specimen on the cantilever to facilitate measuring concentration of an analyte.

Oden does not overcome the noted deficiencies of Thundat '717 and Thundat '686. More specifically, Oden does not describe or suggest directing motile specimens in a fluid toward a surface of the at least one force transducing sensor at an angle substantially orthogonal to the surface, and detecting a measureable characteristic of the motile specimens in accordance with the interaction with the force transducing sensor. Further, as the Office acknowledges that the prior art does not disclose categorizing an interaction of the motile specimens with the force transducing sensor as a result of the motion of the motile specimens as one of an impact, an oscillation, and a retention to facilitate identifying a binding behavior of the motile specimens.

For at least these reasons, claim 26 is patentable over the combination of Thundat '717, Thundat '686, and Oden.

Accordingly, Applicants respectfully request that this rejection of claims 21-26 be withdrawn.

The rejection of claims 21-26 under 35 USC § 103(a) as being unpatentable over U.S. Patent Pub. No. 2003/0222232 to Welland et al. (hereinafter "Welland") in view of Oden is traversed.

Welland discloses a detection means including a laser diode 1 and a photodiode 2 that receives inform by reflection from a planar member 3. The planer member 3 acts as a cantilever, and is mounted within a tube 4 defining fluid flow.

As acknowledged by the Examiner, Welland does not teach that motile frequency and/or binding behavior of a biological specimen on the cantilever is measured to facilitate measuring concentration on an analyte. To overcome this noted deficiency, the Examiner cites to Oden as disclosing a microcantilever that is coated and otherwise configured to interact with analytes in a sample solution. The Examiner further alleges that:

> Oden teaches on page 4, lines 22-34 that oscillation frequency of the microcantilever is measured before, during and after a binding event to determine a change in frequency attributable to the presence of the analyte. Claim 1 further recites that concentration of an analyte in the solution is determined by comparing observed frequency shifts. Motile frequency of analytes can be inferred from this detectable change in cantilever movement.

The Examiner concludes that "[a]t the time of the invention, it would have been obvious to use the Welland system to measure the motile frequency of a plurality of successive biological analytes in order to determine analyte concentration. As evidenced by Oden, it is well known in

the art to determine analyte concentration based on the frequency at which the cantilever is deflected. One of ordinary skill would have understood that observed variations at which the cantilever vibrates are inherently tied to the rate at which motile analytes impact the cantilever."

Applicants respectfully traverse this assertion. Claim 21, as amended, recites a method for detecting motion of motile specimens within a medium, comprising: "directing the motile specimens at the at least one force transducing sensor; sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor ...; and determining the characteristic motile frequency of the motile specimens by detecting the dynamic interaction of the motile specimens with the at least one force transducing sensor...."

No combination of Welland and Oden describes or suggests the invention of claim 21. More specifically, no combination of Welland and Oden describes or suggests directing motile specimens at at least one force transducing sensor, and sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor to determine the characteristic motile frequency of the motile specimens. As set forth above and acknowledged by the Examiner, Welland does not describe or suggest measuring motile frequency and/or binding behavior of a biological specimen on the cantilever to facilitate measuring concentration of an analyte.

Oden does not overcome the noted deficiencies of Welland. Oden describes a cantilever sensing method that involves the combined analysis of one or more higher resonance-mode frequencies, i.e., the simultaneous observation and combined consideration of multiple resonance-mode frequency shifts. Oden does not describe or suggest directing motile

specimens at at least one force transducing sensor, or sensing a dynamic interaction of the motile specimens with the at least one force transducing sensor to determine the characteristic motile frequency of the motile specimens.

For at least these reasons, claim 21 is patentable over the combination of Welland and Oden. Claims 22-25 depend, directly or indirectly, from claim 21 and are also patentable for at least the reasons that claim 21 is patentable.

Claim 26, as amended, recites a method for determining characteristics of a motile specimen under analysis, comprising "directing motile specimens in a fluid toward a surface of the at least one force transducing sensor at an angle substantially orthogonal to the surface; causing an interaction of the motile specimens with a coating on the surface capable of interacting with the motile specimens; allowing the motile specimens to interact with the force transducing sensor; and detecting a measureable characteristic of the motile specimens in accordance with the interaction with the force transducing sensor using a beam directed through a transparent substrate toward the at least one force transducing sensor and a beam reflected by the at least one force transducing sensor through the transparent substrate, the transparent substrate forming a wall of the chamber, wherein the interaction of the motile specimens with the force transducing sensor as a result of the motion of the motile specimens is categorized as one of an impact, an oscillation, and a retention to facilitate identifying a binding behavior of the motile specimens."

With reference to the arguments set forth above with respect to claim 21, no combination of Welland and Oden describes or suggests the invention of claim 26. As acknowledged by the Examiner, Welland does not describe

or suggest measuring motile frequency and/or binding behavior of a biological specimen on the cantilever to facilitate measuring concentration of an analyte.

Oden does not overcome the noted deficiencies of Welland. More specifically, Oden does not describe or suggest directing motile specimens in a fluid toward a surface of the at least one force transducing sensor at an angle substantially orthogonal to the surface, and detecting a measureable characteristic of the motile specimens in accordance with the interaction with the force transducing sensor. Further, as the Office acknowledges that the prior art does not disclose categorizing an interaction of the motile specimens with the force transducing sensor as a result of the motion of the motile specimens as one of an impact, an oscillation, and a retention to facilitate identifying a binding behavior of the motile specimens.

Accordingly, Applicants respectfully request that this rejection of claims 21-26 be withdrawn.

Conclusion

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Although the prior art made of record and not relied upon may be considered pertinent to the disclosure, none of these references anticipates or makes obvious the recited aspects of the invention. The fact that Applicants may not have specifically traversed any particular assertion by the Office should not be construed as indicating Applicants' agreement therewith.

The Commissioner is hereby authorized to charge any additional fees which may be required or to credit any overpayment to Deposit Account No. 501519.

Respectfully submitted,

Eric T. Krischke
Reg. No. 42,769
SCHIFF HARDIN LLP
Patent Department
233 S. Wacker, Suite 6600
Chicago, Illinois 60606
Telephone: 312-258-5519
CUSTOMER NO. 26574
ATTORNEY FOR APPLICANT

CH2\10492787.1